A 60.0 kg jumper jumps from a bridge 50.0m above the water. If the bungee cord is 15.0m

a) What is her gravitational potential energy on the bridge?

Eg = mgh Near Earth

Eg = 60x9.81x50=29 430 J relative to the water

b) What is her kinetic energy when she has fallen 15.0m? (before the cord starts stretching)

60x9.81x15=8,829 J

Eg is transformed into Ek

$v^2 = u^2 + 2as$

$Ek = 1/2mv^2 = 1/2m(2as) = mas$ same thing

$a=g$ $s=\Delta h$

c) what is the spring constant of the cord(k) if she stops just as her head hits the water?

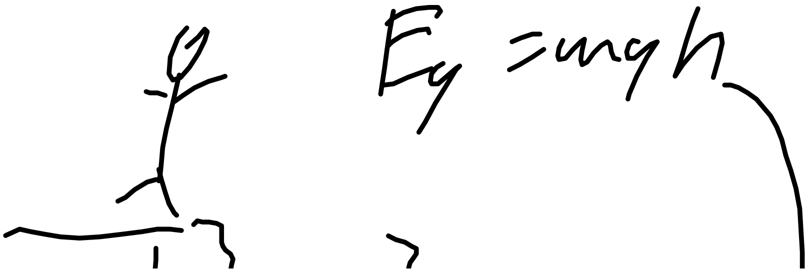
W=ΔEnergy

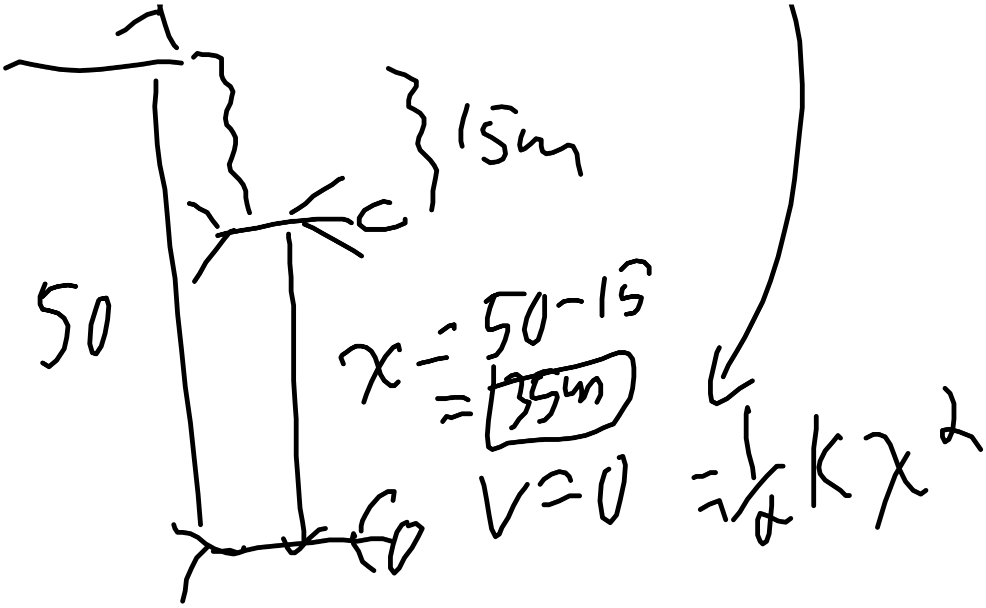
the energy transforms from Eg to Ek to $E_{elastic}$

Eg=Elastic

$mgh = 1/2kx^2$

k = 2x60x9.81x50/(50-15)^2=48.049 N/m = 48 N/m





d) what is her acceleration at the lowest point?

$F=ma = \sum F = F_{up}-F_{down} = F_{elastic} - F_g$

$ma = kx-mg$

$60kg \times a = 48.049N/m (35m) - 60kg \times 9.81N/kg$

$a= ((48x35)-(60x9.81))/60=18.19\ m/s^2$ up

e) where is her acceleration = 0?

$F_{net} = 0$ so $F_{up} = F_{down}$

$Kx = mg$

$$x = \frac{60(9.8)}{48.04\ N/m}$$

$x = 12.25\ m$

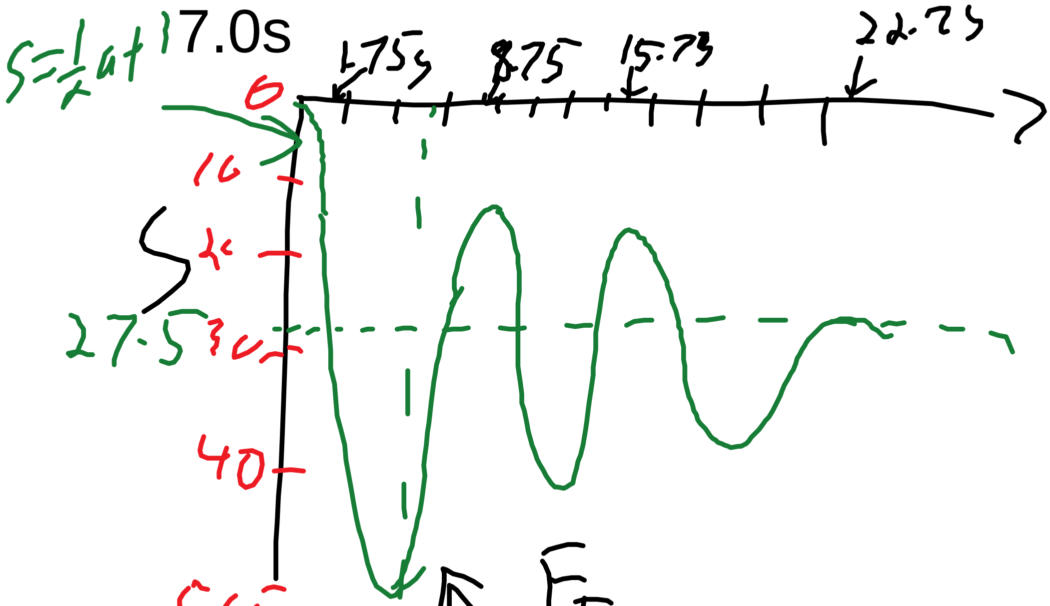
a) sketch her s-t graph assuming the spring energy dissipates over 3 bounces.

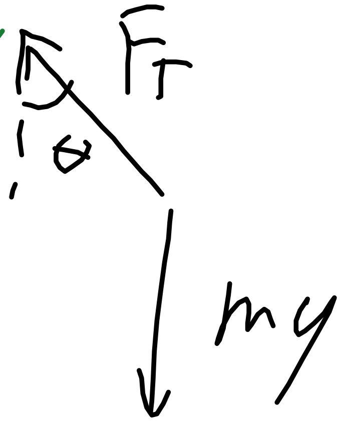
$T = 2\pi\sqrt{\frac{m}{k}} = 2\pi\sqrt{\frac{60}{48}}$

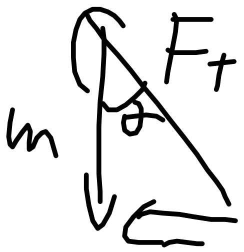
$d = \frac{1}{2}at^2$

$t = \sqrt{\frac{2\times 15}{9.8}} = 1.75\ s$

2x3.14159xSqrt(60/48)=
7.024808797433565 s
7.0s







$F_c = mg\tan\theta$

$$\tan\theta = \frac{g T^2}{4\pi^2 r}$$

$$mg + \frac{mv^2}{r}$$

$$65 \times 9.8 + \frac{65(210)^2}{700}$$

65x9.8+(65x210x210/700)=
4,732